

COURSE OF STUDY *Food Science and Technology (LM70)*
ACADEMIC YEAR 2023-2024

ACADEMIC SUBJECT Multiphasic systems and food chemistry (3 ECTS) -I.C. Foods and applied nutrition (9 ECTS)

General information	
Year of the course	<i>Second</i>
Academic calendar (starting and ending date)	<i>1 semester (25/09/2023-19/01/2024)</i>
European Credit Transfer and Accumulation System (ECTS)	3 ECTS
Language	<i>Italian</i>
Attendance	<i>No Compulsory</i>

Professor/ Lecturer	
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Department and address	<i>DISSPA</i>
Virtual headquarters	<i>Microsoft Teams</i>
Tutoring (time and day)	Tuesday-Friday 9.00-16.00

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/Self-study hours
Hours			
75	16	14	45
ECTS			
3	2	1	
Learning Objectives	Knowledge about the main chemical and physical interactions of food constituents as well as the chemical transformations that the main components of food undergo during processing and storage		
Course prerequisites	Knowledge of general, inorganic and organic chemistry. Knowledge of food constituents. Knowledge of the main food technologies		
Teaching strategy	Lectures will be presented through PC assisted tools (PowerPoint, video). Field and laboratory classes, reading of regulations will be experienced. Lecture notes and educational supplies will be provided by means of online platforms		
Expected learning outcomes	The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification)		

Knowledge and understanding on:	knowledge about the main chemical and physical interactions of food constituents as well as the chemical transformations that the main components of food undergo during processing and storage.
Applying knowledge and understanding on:	<p>knowledge of the qualitative characteristics of the by-products deriving from the productive processes object of the teaching</p> <p>Ability to apply a systemic approach to the assessment of food composition and characteristics</p> <p>Ability to trace the phenomena and constituents that determine the characteristics and quality of food and its evolution over time</p> <p>Ability to describe chemical characteristics and structural organisation of innovative food systems</p>
Soft skills	<ul style="list-style-type: none"> ○ Making informed judgements and choices ○ Ability to describe the constituents and chemical phenomena underlying the macroscopic characteristics and phenomena affecting food ○ Communicating knowledge and understanding ○ Ability to describe possible technologies to exploit waste and by-products ○ Capacities to continue learning ○ Ability to deepen and update their knowledge of chemical and physical interactions of food constituents.
Syllabus	
Learning Objectives	Knowledge about the main chemical and physical interactions of food constituents as well as the chemical transformations that the main components of food undergo during processing and storage
Course prerequisites	Knowledge of general, inorganic and organic chemistry. Knowledge of food constituents. Knowledge of the main food technologies
Contents	<p>Water in food: water activity and effects on physico-chemical properties and shelf-life.</p> <p>Dispersed systems: differences between dispersion and colloid; emulsions and emulsifiers; examples of food emulsions; foams; polysaccharide gels; pectins, alginates, carrageenans, gums; technological and functional properties of inulin; protein gels.</p> <p>Maillard reaction, Acrylamide, AGEs: description of chemical processes; analysis of effects in food; effects related to consumer health.</p> <p>Antioxidants and their mechanisms of action in relation to food storage.</p> <p>The physico-chemical characteristics of food design: functional properties of innovative ingredients for tailor-made foods; outlines of food rheology.</p>
Books and bibliography	<p>Notes from lectures and laboratory classes. Presentations (in pdf) provided by the teacher.</p> <ul style="list-style-type: none"> • Coultate T. P., La Chimica degli Alimenti. Zanichelli (Bologna), 2004. • Fennema, O. R. (2010). Dispersed systems. In: Food Chemistry. Marcel Dekker. • Reviews scientifiche da letteratura di settore Per approfondimenti: • Belitz, H.-D., Grosch, W., & Schieberle, P. (2009). Food chemistry. Springer. • Wong D. W. S., Mechanism and Theory in Food Chemistry. Springer, 1989. • Cappelli P., Vannucchi V., Chimica degli alimenti. Conservazione e trasformazioni. Zanichelli (Bologna), 1994 • Cabras P., Martelli A., Chimica degli alimenti, Piccin (Padova), 2004.
Additional materials	Notes, slides and other bibliographic materials will be furnished during the course

Assessment and feedback	
Methods of assessment	<p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in practical activities (laboratory and educational visits).</p> <p>Students may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for one academic year (Art. 4 of the Didactic Regulations of the Master's Degree Course in Food Science and Technology). The result of the mid-term exam is communicated by publication in the student's electronic register and contributes to the assessment of the profit examination by means of calculation of the weighted average.</p> <p>The exam for foreign students may be conducted in English as described above.</p>
Evaluation criteria	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Describe the main chemical and physical interactions of food constituents <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Describe the phenomena and constituents that determine the characteristics and quality of food products and their evolution over time <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Express reasonable assumptions to change the characteristics and quality of food presented <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Describe the constituents and chemical phenomena underlying the macroscopic characteristics and phenomena affecting foods presented as case studies <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> ○ Envisaging a possible approach for the chemical features evaluation
Criteria for assessment and attribution of the final mark	<p>The evaluation criteria that contribute to the attribution of the final mark will be: knowledge and understanding, the ability to apply knowledge, autonomy of judgment, i.e. the ability to criticize and formulate judgments, communication skills</p>
Additional information	